

## **Ecological preferences of water beetles (Coleoptera: Noteridae and Dytiscidae) in the Ceske Svycarsko National Park**

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**Abstract:** Faunistic and ecological results of water beetles (Coleoptera: Noteridae, Dytiscidae) studied in the territory of the České Švýcarsko National Park are presented. In 2002, two species of the family Noteridae and 47 species of the family Dytiscidae were found. Only five environmental factors (pH, conductivity, vegetation, shading and area) were significant at  $P > 0.001$  level. The following interesting species of Dytiscidae were found: *Agabus subtilis* ERICHSON 1837; *Hydroporus gyllenhalii* SCHÖDTE 1841; *Ilybius crassus* THOMSON 1854.

Ceske Svycarsko National Park is located in northern Bohemia and it is the most recent national park in the Czech Republic. It was established in 2000 in the most valuable part of the Labske piskovce protected landscape area.

At present, 118 species of the family Dytiscidae and 2 species of the family Noteridae are known to occur in the Czech Republic (RIHA 1992, 1993). The current summary about water beetles in the Czech Republic presents STASTNY et al. (1999).

In this project I tried to indentify differences in species distribution in various types of aquatic habitats and factors that are responsible for such differences, as well as to provide a suitable classification of the studied biotopes.

Qualitative samples were taken at 15 localities from April to November 2002 in monthly intervals. Adult beetles were collected extensively using a kitchen sieve (diameter 20 cm) or aquatic net, and subsequently killed by ethyl acetate in vials filled with sawdust. Keys by SCHAEFLEIN (1971), GALEWSKI & TRANDA (1978), and NILSSON & HOLMEN (1995) were used for indentification; some specimens were checked by J. Hajek (Praha). All specimens are stored in my collection (dry-mounted or stored in 75 % alcohol). Larvae were not studied.

Data were evaluated using CCA (canonical correspondence analysis) as implemented in CANOCO version 4.5 (TER BRAAK & SMILAUER 1998). The significance of each factor was tested by Monte Carlo permutation test.

In 2002, seven to eight samples at each locality altogether yielded 1700 specimens of 2 species of the family Noteridae and 47 species of the family Dytiscidae (40 % of species known from the Czech Republic (RIHA 1993)).

From nine environmental factors selected, only five (pH, conductivity, vegetation, shading and size of water body) were significant at  $P < 0.001$  level. Distribution of

individual species within studied localities is congruent with the pattern provided by HEBAUER (1994).

The results of statistical analysis are as follows:

- (1) Distribution of individual species is affected by the examined factors and most of the variability can be explained by the graph. The first two axes of ordination CCA analysis explain 55 % of the variability (first axis 32 %).
- (2) Distribution of individual species within studied localities is congruent with the pattern provided by HEBAUER (1994). Following the traditional synecological division of species groups, the survey identified tyrphophils, acidophils, and iliophils, as the most abundant groups in the area.

Tyrphophilic species are specialists that require the presence of *Sphagnum* moss. They inhabit water bodies with extensive growths of submerged vegetation (*Sphagnum* and other plants), high shading, and low pH values (i.e., they are extremely acidophilic) (e.g. *Hydroporus melanarius* STURM 1835; *H. obscurus* STURM 1835 and *Ilybius crassus* THOMSON 1854).

Acidophilic species are also common in the studied area. Most surveyed localities are acidic swamps and bog-like water bodies, and most species thus occur near the centre of the diagram. They are characterised by low pH values and high shading.

Iliophilic species show little habitat requirements. They inhabit larger, unshaded (open) water bodies with higher pH values (e.g. *Agabus melanarius* AUBÉ 1837; *Ilybius quadriguttatus* (BOISDUVAL et LACORDAIRE 1835) and *Noterus crassicornis* (O.F. MÜLLER 1776)).

The remaining two groups are poorly represented in the studied area. Cryophilous species are "hidden" in the tyrphophilic ones, since the *Sphagnum* habitats are similar to their natural habitats in cold areas. The find of reophilic species in the studied area was accidental, because there was only stagnant water monitored.

The following interesting species of Dytiscidae were found: *Agabus subtilis* ERICHSON 1837, *Hydroporus gyllenhalii* SCHIÖDTE 1841 and *Ilybius crassus* THOMSON 1854.

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### Zusammenfassung

Das Ergebnis faunistischer und ökologischer Studien der Wasserkäferfauna (Coleoptera: Noteridae, Dytiscidae) im Nationalpark České Švýcarsko wird vorgestellt. Im Jahre 2002 wurden 2 Arten der Familie Noteridae und 47 Arten der Familie Dytiscidae nachgewiesen. Darunter befinden sich folgende bemerkenswerte Funde: *Agabus subtilis* ERICHSON 1837, *Hydroporus gyllenhalii* SCHIÖDTE 1841 und *Ilybius crassus* THOMSON 1854.

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